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A COMPARATIVE STUDY OF FIVE DUTCH DISEASE MODELS

A Thesis Presented in Partial Fulfilment of the Requirements

for the Degree of

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LEE TIN TAN

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ABSTRACT

During the past decade, the sudden and sharp increases in oil prices, coupled with the discovery and extraction of oil in the North Sea, have contributed considerable interest in the macroeconomic problems of oil-exporting countries. It is well known that a domestic oil discovery can give rise to wealth effects that cause a squeeze in the traded goods sector of an open economy. The decline of the manufacturing sector following an oil discovery is termed the 'Dutch disease', and has been investigated in many recent studies which embody a general equilibrium model. This is detailed in Chapter One where the development of Dutch disease literature is discussed.

Despite the development of a wide range of the Dutch disease models, There is still a lack of consensus regarding the analysis on the issue of Dutch disease. This thesis aims to study a number of different models of the Dutch disease by focussing on the following considerations:

i) the underlying theoretical framework with reference to some main-stream economic theories, such as those based on Trade theory, Neoclassical and Keynesian traditions;
ii) the assumptions made within each framework regarding monetary and supply-side conditions;
iii) analysis of the various effects of exogenous disturbances on the economy; and

iv) evaluation of the relationship between the underlying assumptions and the conclusions drawn from the model analysis.

Chapter Two outlines the classification of the Dutch disease model into three broad categories. These categories distinguish between the types of macroeconomic effects which give rise to the Dutch disease phenomenon. Detailed algebraic specification of each model, using standard notations developed for this thesis, along with the assumptions made are described in Chapter Three. Chapter Four is devoted to a comparative study of the models. In each section, two models are compared to draw out the differences in their assumptions and approach, and to show how these differences can affect their final conclusions about the effect of various exogenous disturbances. A summary of the main results of the comparative study is given in Chapter Five. Some points for further research are also briefly discussed.

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LIST OF TABLES AND FIGURES

CHAPTER 1 INTRODUCTION

Major energy price increases during the periods 1973/4 and 1979/80 caused significant increases in national wealth in oil-exporting economies. Similar windfalls occurred in economies that enjoy major resource discoveries. In both cases, the wealth increases have a systematic impact on the domestic economy,leading to some adjustment problems. These adjustment problems often take the form of a decline in the level of activity in both the export oriented and import-competing manufacturing sector. This experience is now commonly referred to as the "Dutch disease". The term "Dutch disease" was coined when the problems that North Sea oil might create for Britain were widely discussed[1]. It relates to the Dutch experience where the 1960's discoveries of the Schlochteren natural gas allowed the Netherlands to have a higher exchange rate than otherwise, with the net result that her export industries were squeezed, and a decline in Dutch manufacture set in. The Dutch experience is discussed in Ellman (1977), and in Barker & Brailovsky (1981).

The analysis of the Dutch disease has been the subject of many recent studies, and also a topic for lively debates in the United Kingdom in the early 1980's. Earlier studies on what later came to be known as the Dutch disease problem consisted of some empirical articles using partial-equilibrium analysis. Gregory (1976) made the earliest suggestion that the development of a natural resource implies a necessary relative decline in manufacturing industry. Gregory 's paper outlined the structural shifts likely to occur in the Australian

economy as a result of the development of a large-scale mining sector. This analysis was applied to the United Kingdom and North Sea oil by Forsyth & Kay (1980). The theoretical stance taken by Forsyth & Kay was almost identical to that of Gregory, although their presentation differed considerably. Instead of adopting a formal model, Forsyth & Kay compared the structure of the U.K. economy in 1976 (which they asssumed to be a non-oil economy) with an economy which had undergone the structural adjustment to the introduction of North Sea oil. Forsyth & Kay analysis was strongly criticized in the Astridge lecture by the Governor of the Bank of England (1980). This view maintains that the large increase in the exchange rate and the fall in manufacturing production levels in the late 1970's and early 1980's is a pure coincidence and that the effects of North Sea oil production have largely been to protect the United Kingdom economy from having to make large structural adjustments to the 1973/4 and 1979/80 oil price rises.

The three articles cited above are well discussed in Hall & Atkinson (1983). They concluded that the exploitation of a natural resource will cause an absolute decline in the domestic production of tradables, provided that the economy starts from a position of balance of payment equilibrium and if nothing else changes. They pointed out that the Forsyth & Kay analysis was far too simple, and that in the 1970's, oil production in U.K. was superimposed on a substantial balance of payment deficit, while between 1979 and 1981, the decline in manufacturing production was mainly the result of restrictive economic policies and the consequent high exchange rate. They also pointed out

that the recession was against a background of a long-term trend of decline in the share of manufacturing in total output - a process called de-industrialisation, which was apparent well before the arrival of North Sea oil.

Other discussions on the issues of energy, industrialisation, and economic policy relating to the experience of Canada, Mexico, Norway and the United Kingdom can be found in Barker & Brailovsky (1981).

Despite their important contribution, especially on the empirical issues involved, these studies fall short of formulating a comprehensive theoretical framework for a general equilibrium analysis. However, in the Australian case, Snape (1977) extended Gregory's framework by allowing for general equilibrium repercussions, but retaining his main assumptions. Snape obtained results which are modification or extension of those of Gregory. Following this, Corden & Neary (1982) drew on and extended the Australian analyses by Gregory and Snape in a general equilibrium framework in the study of a booming resource sector and de-industrialisation in a small open economy. During this period, other studies of the problem of Dutch disease were also published. These include those of Buiter & Purvis (1982); Eastwood & Venables (1982); Bruno & Sachs (1982b); and Neary & Purvis (1982). Some later studies were carried out by Pesaran (1984); and Fender (1985). These studies have all included a general equilibrium model with an explicit treatment of an energy/oil sector in open economy for the analysis of various energy shocks.

While these analyses of the Dutch disease were developed to a sophisticated level, they still failed to produce a general model on the subject. They display the folowing five different approaches to model building:

i. a focus on macroeconomic effects of a resource boom with short-run dynamics arising from sluggish adjustment of domestic prices adopted from Dornbusch (1976) specification. This approach is in Buiter & Purvis ;and Eastwood & Venables.

ii. a focus on macroeconomic effects but followed a Keynesian macroeconomic framework with foreign exchange controls and government budget constraints; and with a dynamic structure arising through private sector asset position. This is in the study carried out by Pesaran.

iii. a focus on the sectoral resource allocation and income distribution of an economy with a booming resource sector. Corden & Neary draw on the standard tools of international trade theory in this approach.

iv. an analysis on the sectoral effects of a resource boom with dynamics arising from short- and long-run adjustment of consumption and investment demand. This is carried out in the study by Bruno & Sachs (1982b). Their model incorporates far-sighted behaviour by firms and household (in their investment, consumption and savings decisions); as well as capital accumulation in the aggregate.

v. a study on the nominal and real adjustment of energy shocks. This is in Fender, and Neary & Purvis. However, the Fender's model is an extension of the Buiter & Purvis model with the

inclusion of a nontradable services sector and treats oil as an intermediate input. Neary & Purvis adopted the basic framework of Corden & Neary, but with an extension to include study on dynamics arising from the short-run capital adjustment process as well as monetary adjustment.

This thesis attempts to explore the manner in which each model address the macroeconomic impact and sectoral effects of an economy experiencing a resource boom. That is, it will examine the different arguments put forward in each model regarding the Dutch disease phenomenon. Despite the different approaches used in the seven articles cited previously, they all shared the aim of analysing the effects of energy shocks on the rest of the economy, especially on the implications on tradable manufacturing sector.

This research will begin with a detailed study on the structure of each model, drawing out the inherent assumptions governing the theoretical framework and analysis of each model. Whenever possible, comparison between models will be carried out to highlight the influence of a particular model characteristic to the subsequent analysis and results.

note:

1) See Corden, W.M. (1982).